

Catching the Wind

Risks and Opportunities in India's Wind Sector

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Energy Access



Renewables



Low-Carbon Pathways



Greenhouse Gases and Monitoring, Reporting, Verification



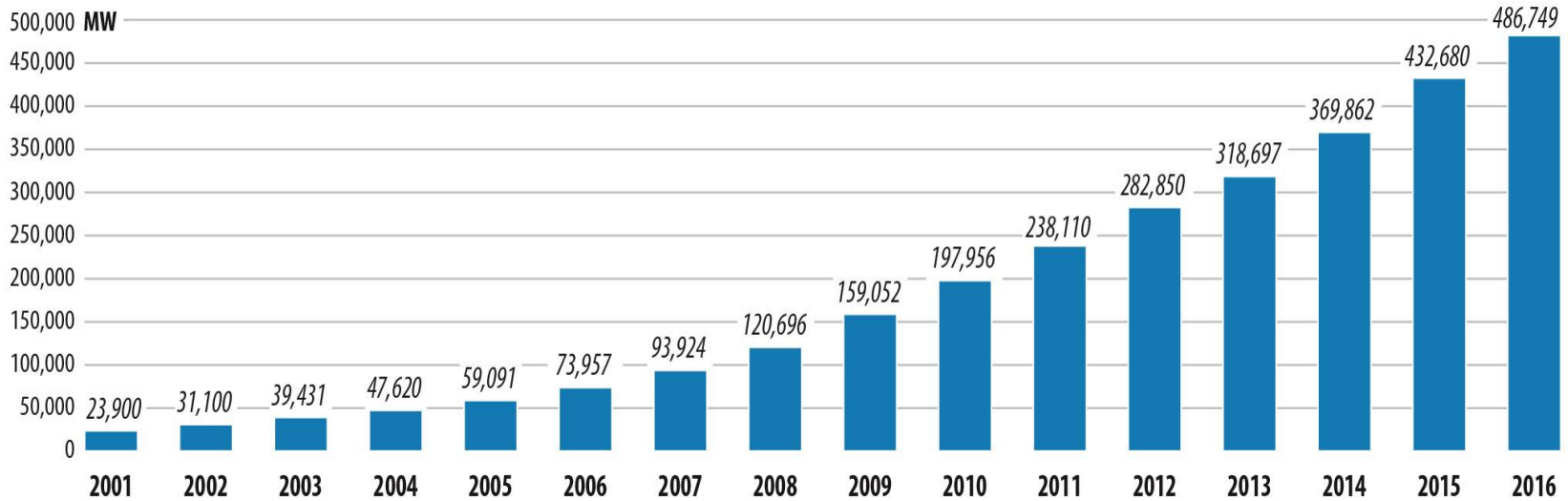
Risks and Adaptation



Technology, Trade & Finance

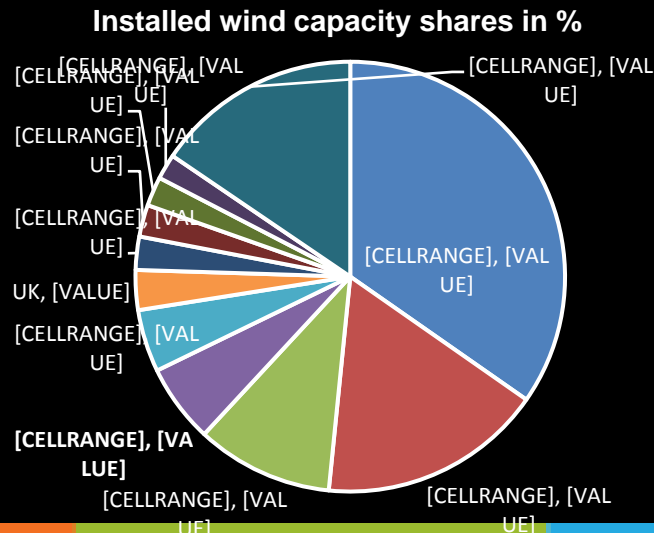
Gust of wind capacity – World

GLOBAL CUMULATIVE INSTALLED WIND CAPACITY 2001-2016

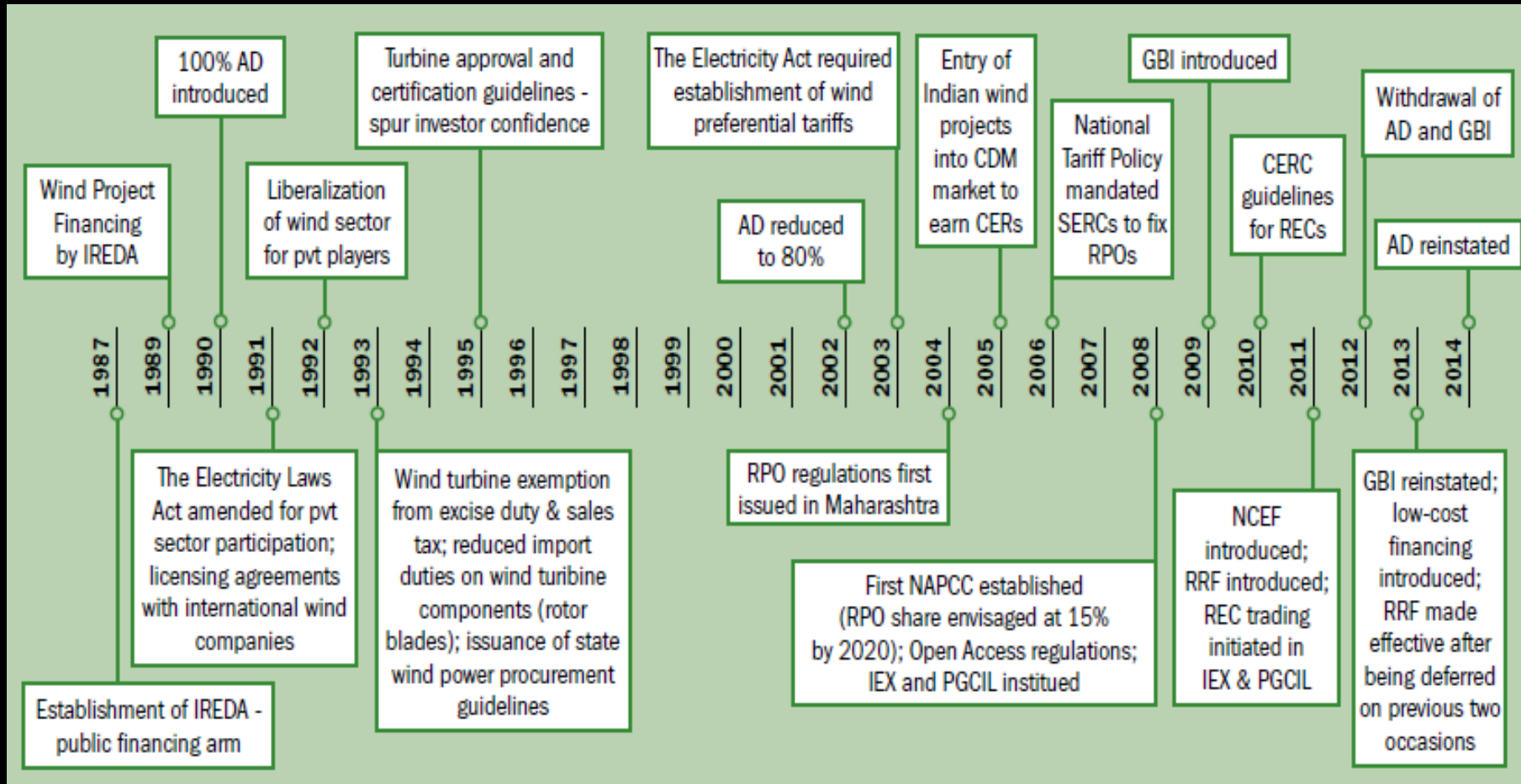


Source: GWEC

- India currently has the fourth largest installed wind capacity in the world

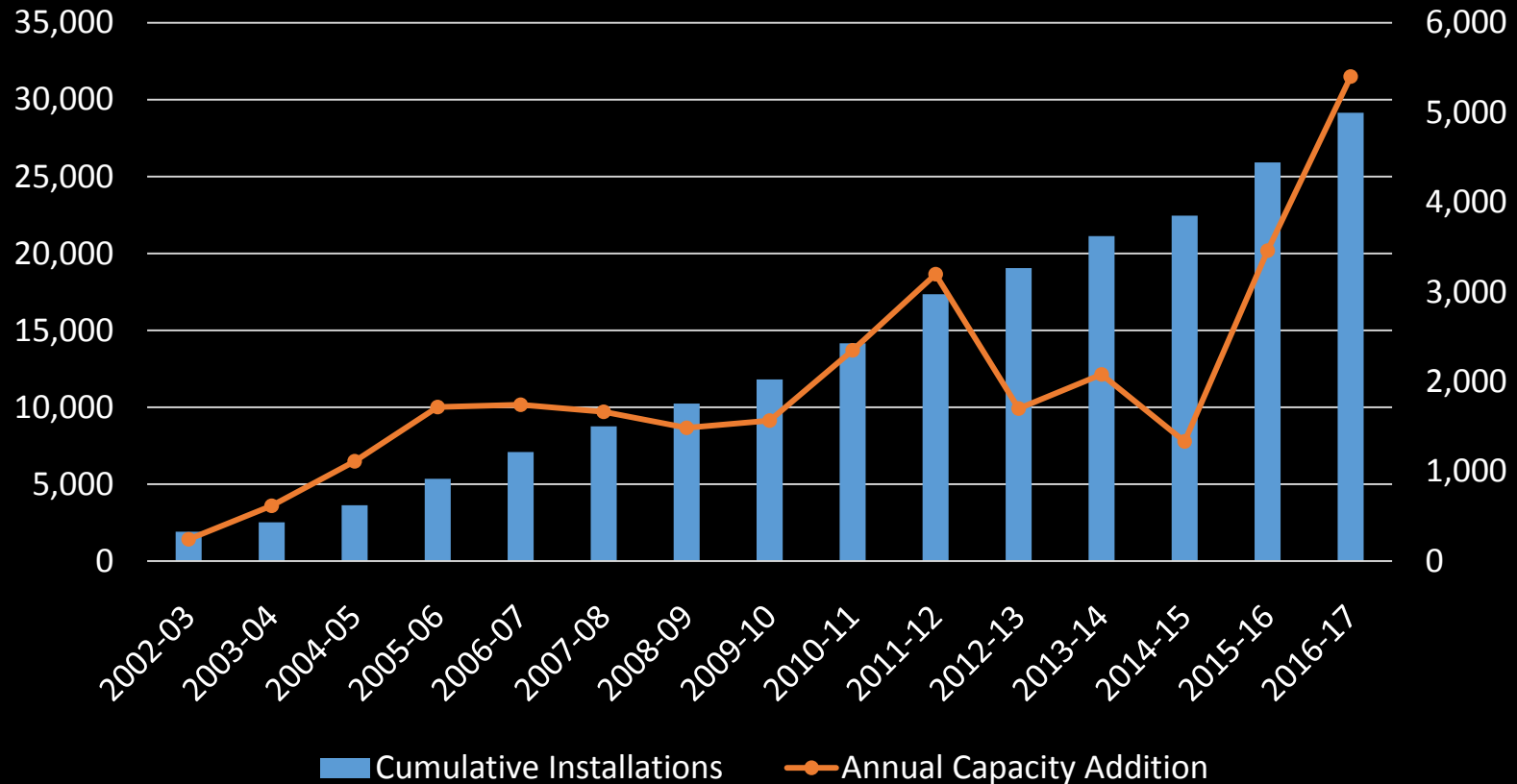


Winds of change



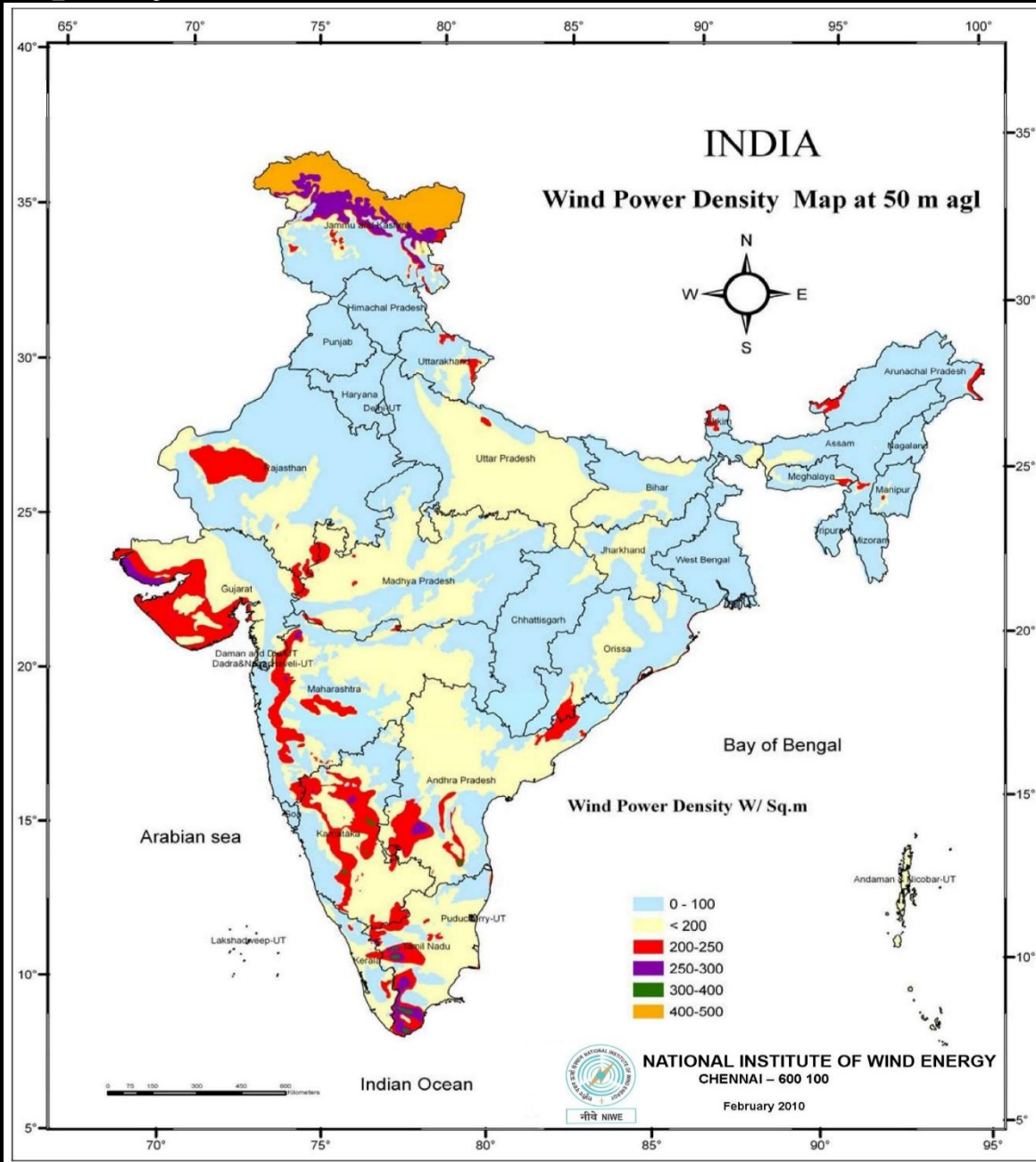
- National off-shore wind energy policy approved in September 2015
- Draft national wind solar hybrid policy announced in August 2016

Wind Capacity Growth in India

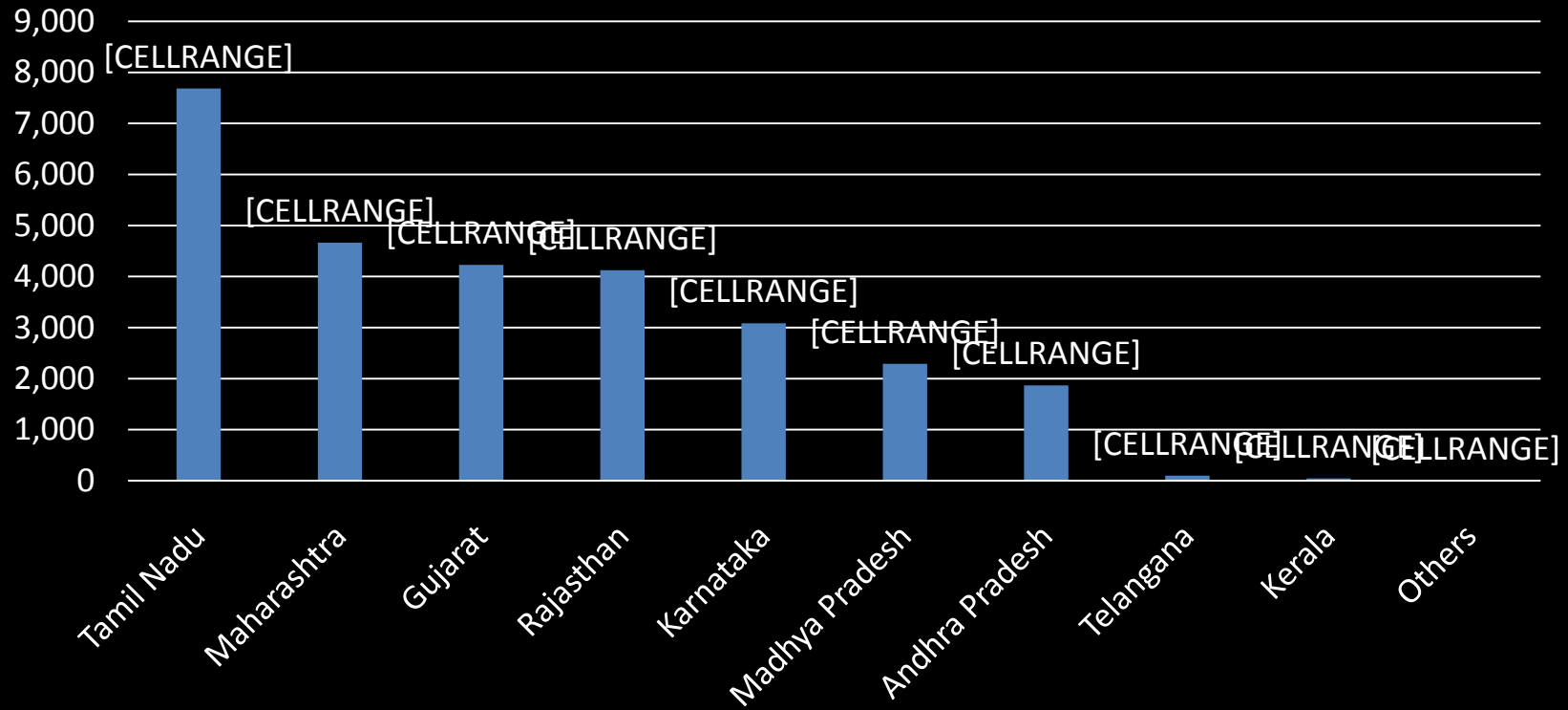


- **Wind capacity will have to grow at a compound annual growth rate of 15% to reach the 60 GW target by 2022**

Gust of wind capacity – India

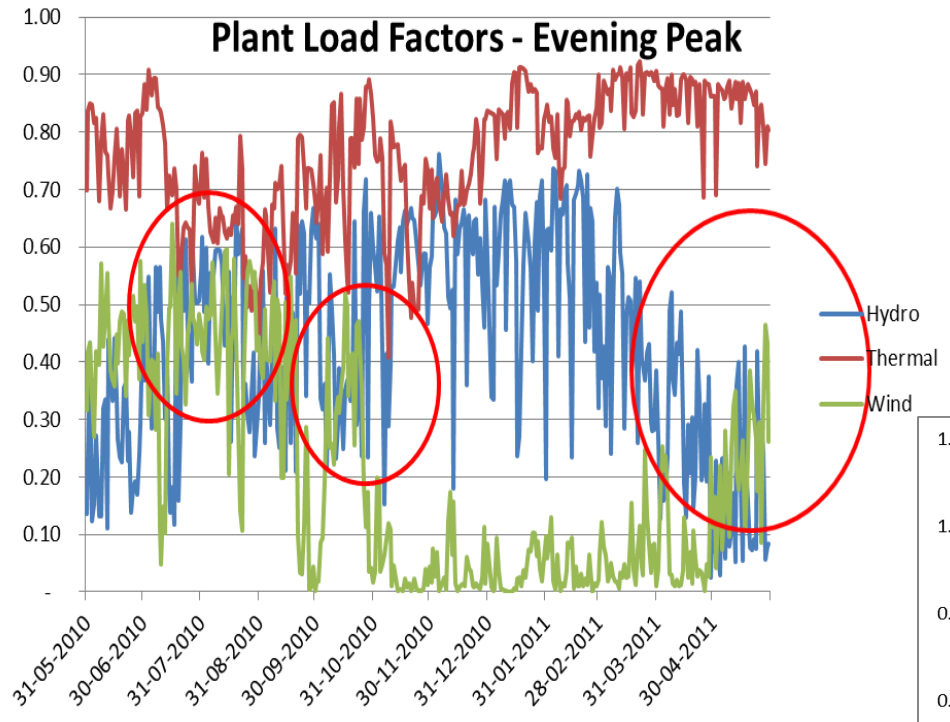


State wise Wind Installation (MW)

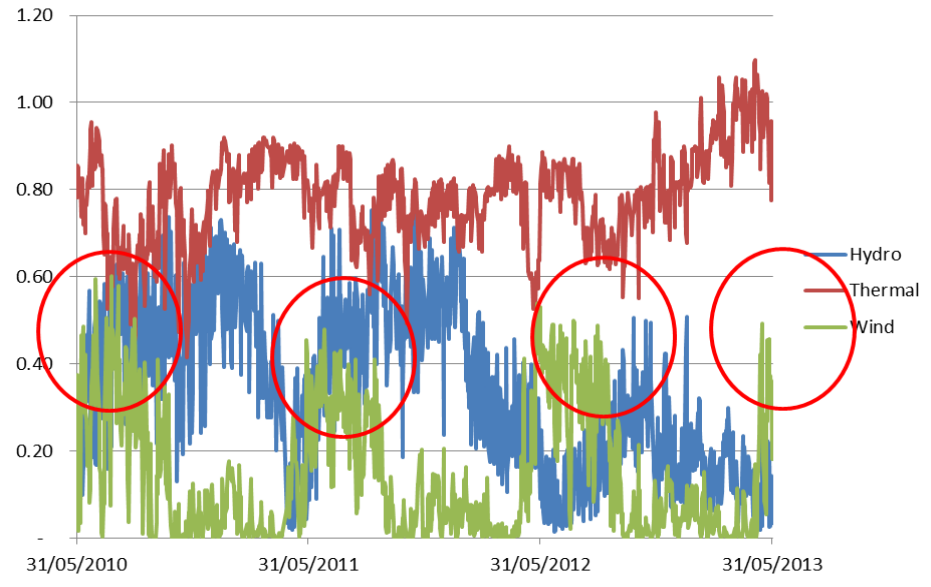


- High wind potential primarily in only a few states
- Going forward, tradeoff between open access transmission and harnessing wind in states with lower wind potential

Wind has a role in energy security



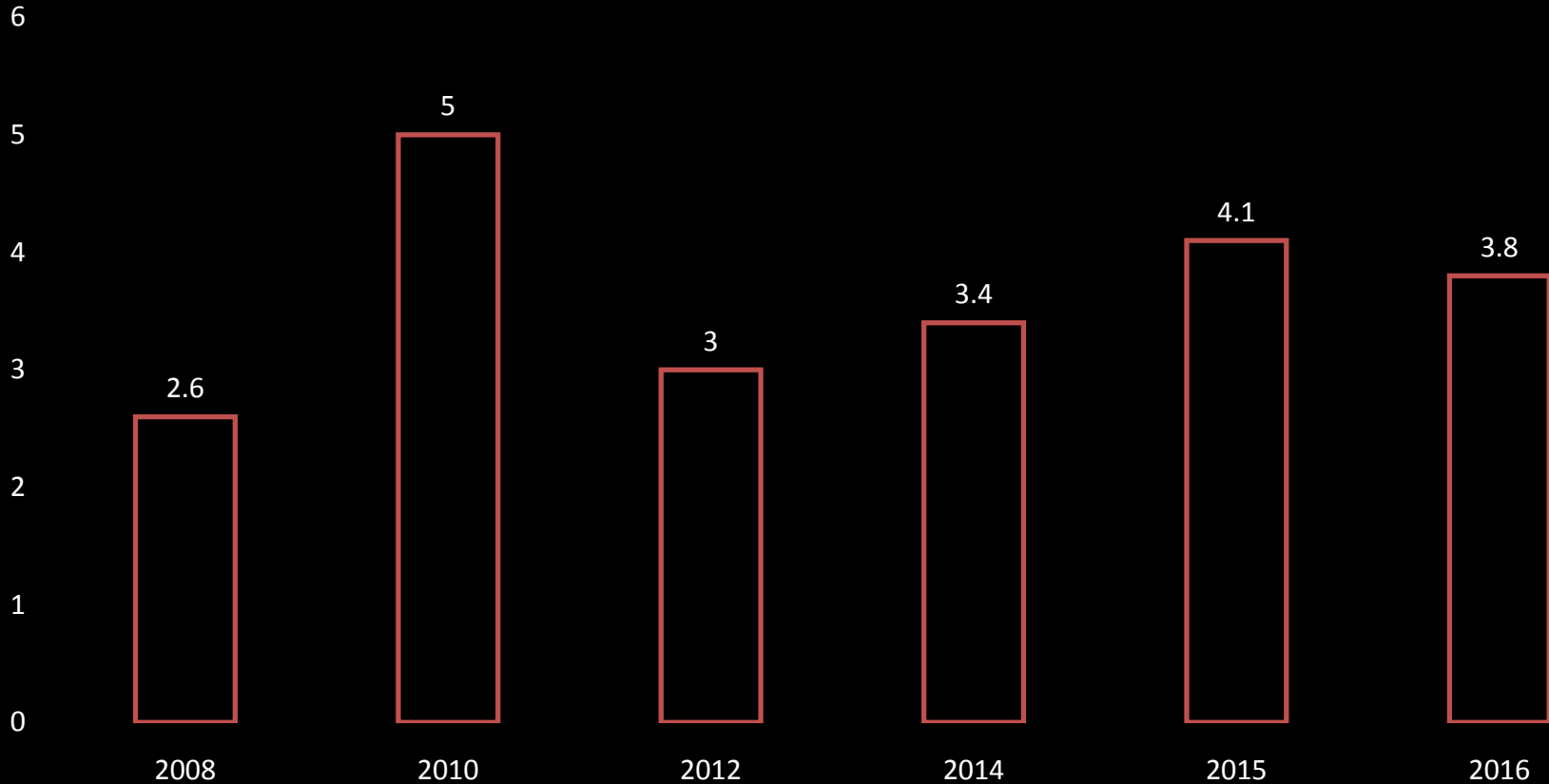
Morning peak



Evening peak

- Wind contributes to the lowering of the PLFs of thermal power stations during peak periods
- In Tamil Nadu, wind energy is able to sustain domestic activity and uninterrupted industrial production

Investment in USD billion



- **A total investment of up to USD 32 billion is required to install the remaining 30 GW of wind capacity by 2022**

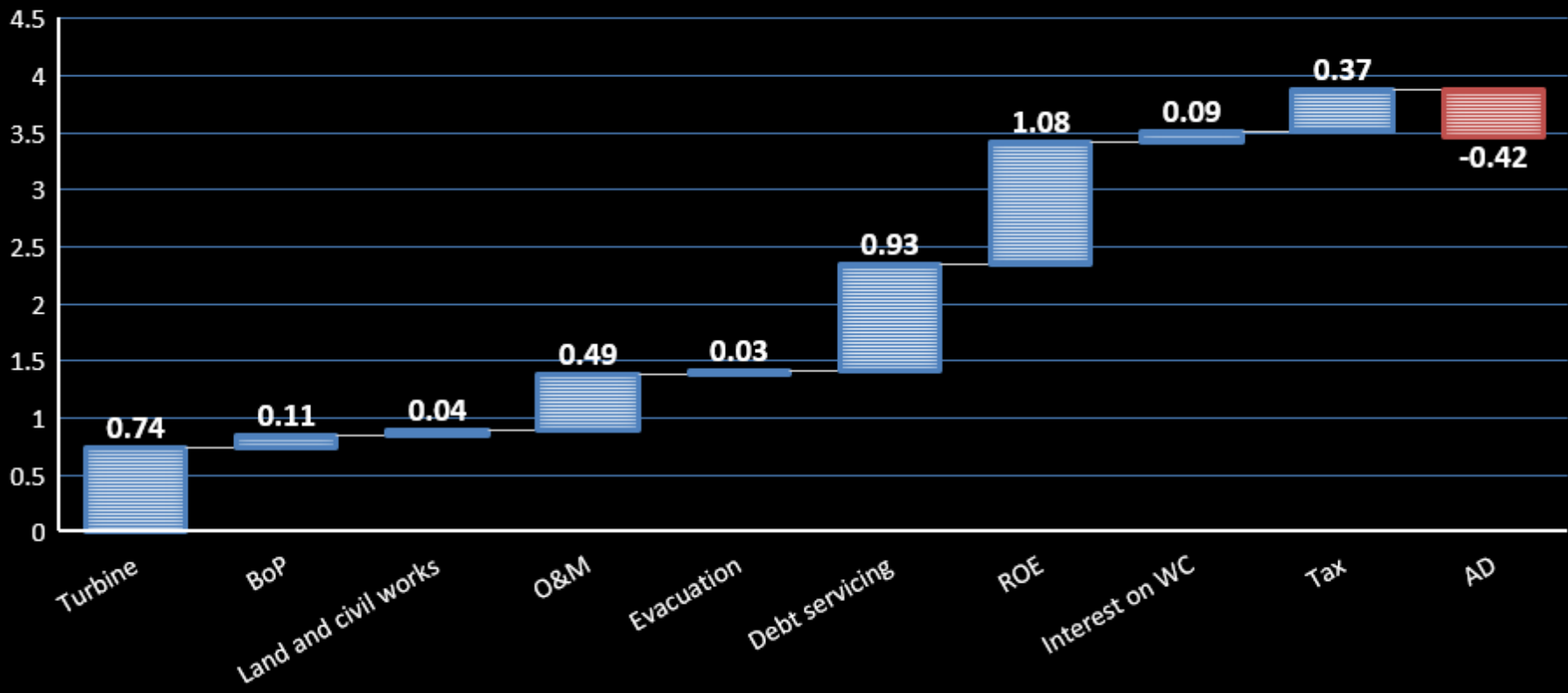
Challenge 1: financiers perceive risk

Investor Group	Predominant Risks Reported
Banks and NBFCs	<ul style="list-style-type: none"> • Offtaker risk • Construction and regulatory risk • Equity stability risk
International Organisations (Debt)	<ul style="list-style-type: none"> • Foreign exchange risk • Offtaker risk • Construction and regulatory risk
International Organisations (Equity)	<ul style="list-style-type: none"> • Offtaker risk • Construction and regulatory risk
Venture Capital and Private Equity	<ul style="list-style-type: none"> • Offtaker Risk • Evacuation infrastructure risk • Construction and regulatory risk

Deconstructing the wind tariff



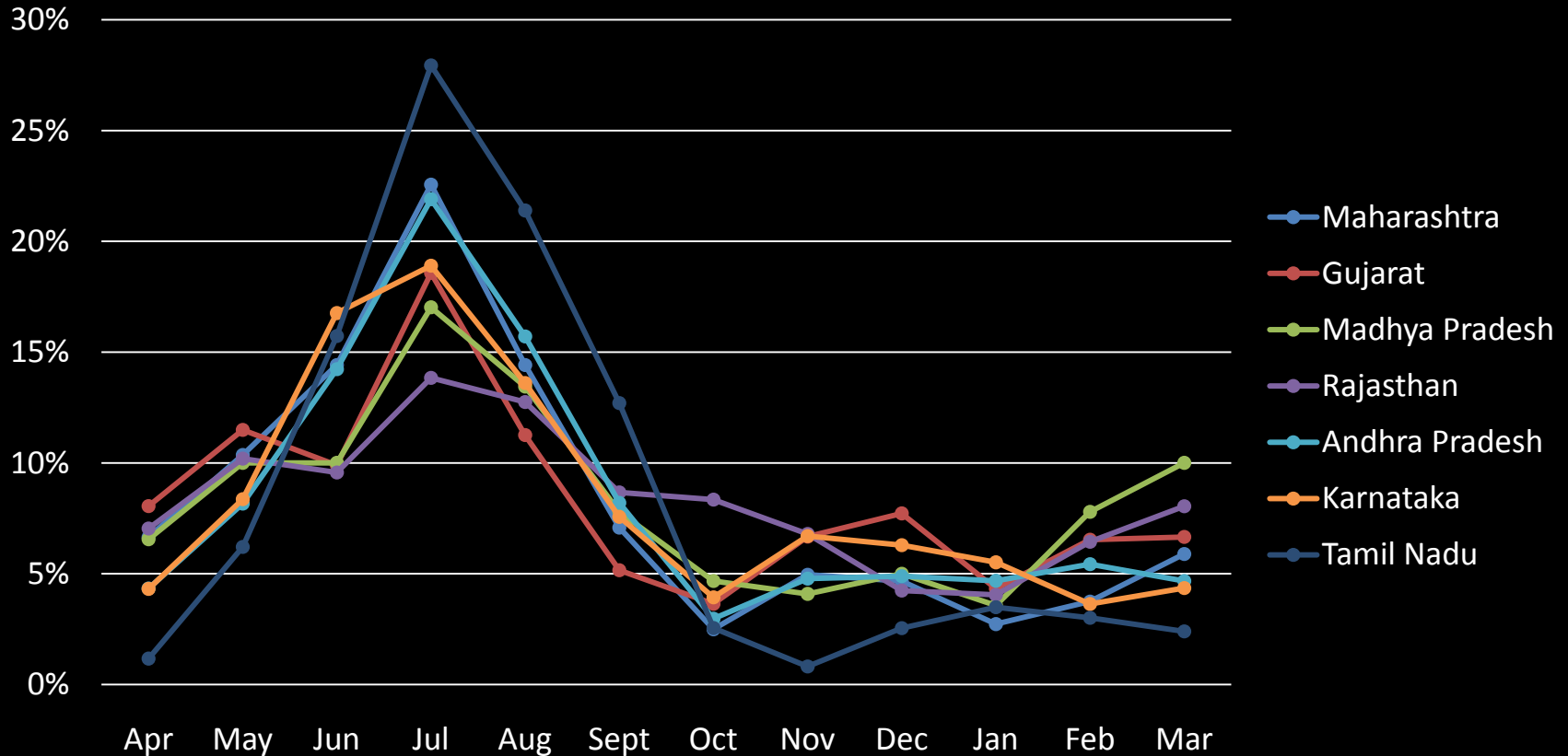
WIND TARIFF (INR3.46/KWH)



- **INR 2.10 of the total LCOE of INR 3.46 (60%) is the cost of finance**

Challenges 2: Seasonality of wind generation

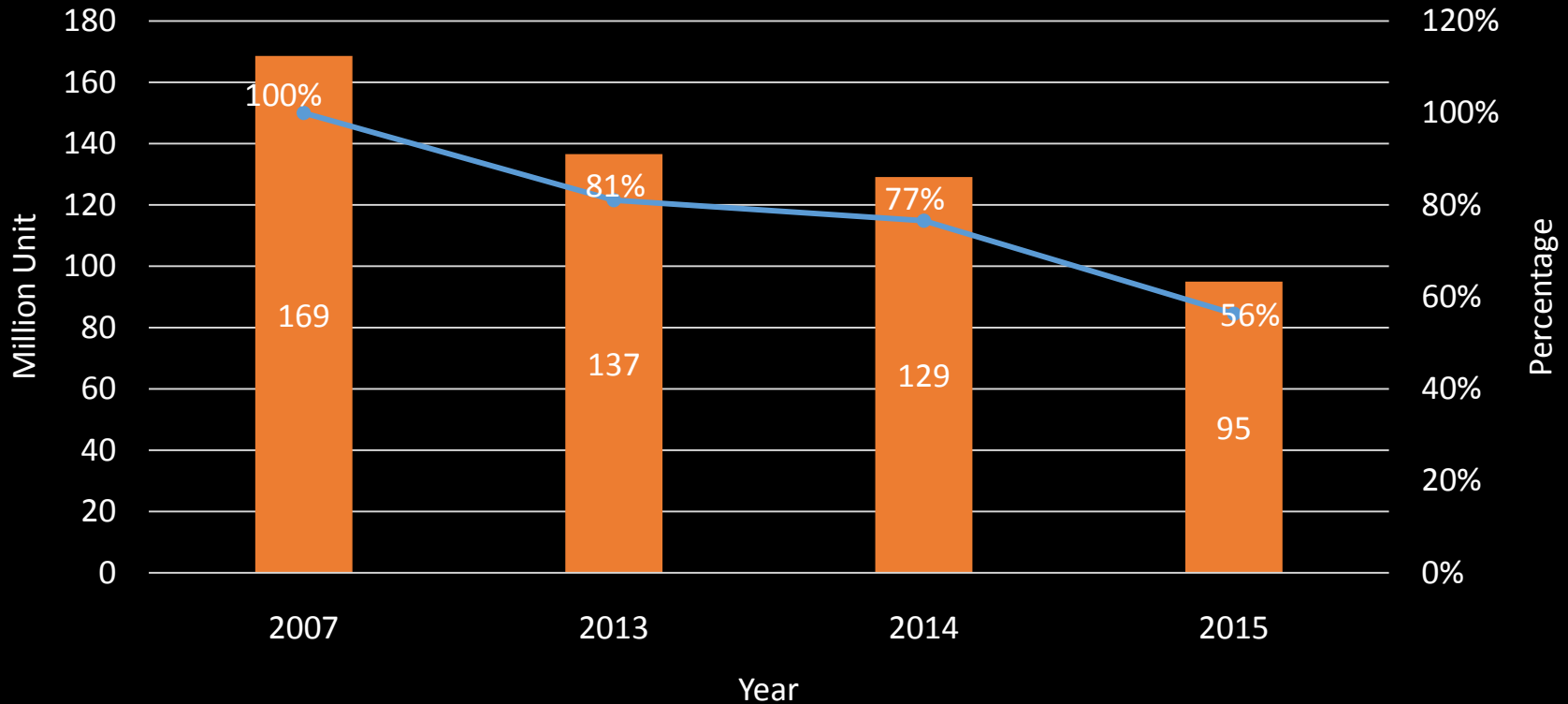
Share of electricity generated (out of total) in each month across states



- Wind generation is primarily limited to only a few months – large wind installation would still need to be supplemented through conventional as well as solar and hydro plants
- Wind alone or hydro alone cannot pick up the slack that thermal power offers and at times they have to work in tandem and the more easily varied resource contributes at varying levels

Challenge 3: Generation backdown

Wind Power Sold- Plant in Tamil Nadu (74 MW)

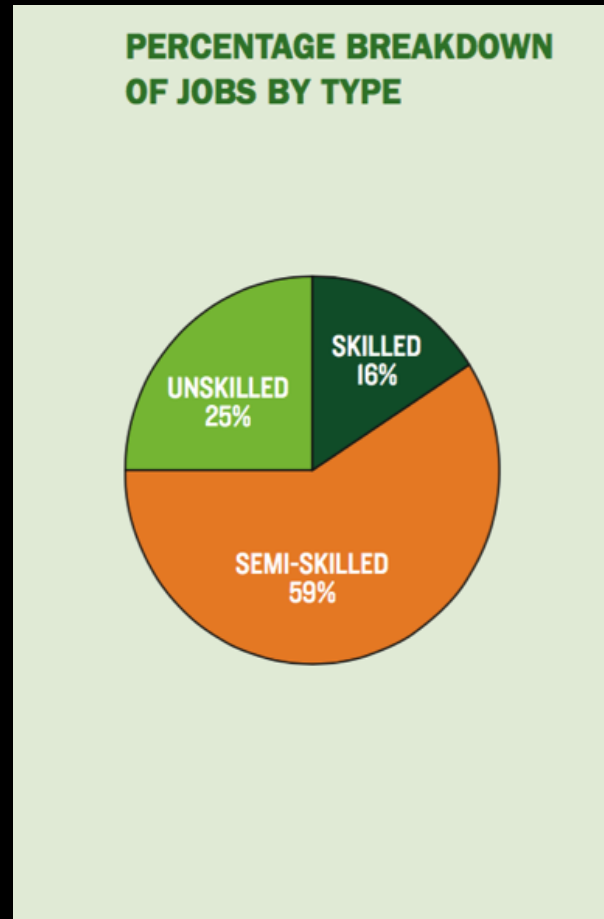


Others issues

- Higher intermittency – grid integration and generation forecasting
- Transmission Infrastructure – transfer of wind generation to non-windy state
- Delayed payment to generators
- Non-honouring of PPAs, non-signing of new PPAs

Challenge 4: Speed and scale...but skill?

- 48,000 people are currently employed by the wind industry in India
- Wind sector creates as many as 180,000 jobs by 2022
- Sector will employ about additional manpower each year to operate and maintain wind plants.



THANK YOU

<http://ceew.in/renewables>